

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 11

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHAHROKH ETEMAD,
HASAN UL KARIM and
WILLIAM C. PFEFFERLE

Appeal No. 2000-1345
Application 09/097,176

ON BRIEF

Before CALVERT, STAAB and McQUADE, Administrative Patent Judges.

McQUADE, Administrative Patent Judge.

DECISION ON APPEAL

Shahrokh Etemad et al. appeal from the final rejection of claims 1 through 6, all of the claims pending in the

application.¹

THE INVENTION

The invention relates to "an apparatus and method for increasing the reactivity of a fuel/air mixture prior to homogenous combustion of the mixture" (specification, page 1).

Claims 1 and 4 are representative and read as follows:

1. A method for enhancing a first fuel/air mixture so that when said first fuel/air mixture is added to a second fuel/air mixture said second fuel/air mixture will combust with greater stability, said method comprising:

generating said first fuel/air mixture,

introducing said first fuel/air mixture to a non-catalytic centerbody via an entrance defined by said centerbody,

expelling said first fuel/air mixture from said centerbody through a plurality of exits defined by said centerbody, and

heating said centerbody using the heat of combustion of said second fuel/air mixture.

4. A pilot comprising:

a flow conditioner,

¹Claims 1, 4 and 6 have been amended subsequent to final rejection.

Appeal No. 2000-01345
Application 09/097,176

a centerbody positioned within the flow conditioner, said centerbody being non-catalytic material, and said centerbody having an entrance and multiple exits defined by said centerbody, and

a pilot wall, said flow conditioner connected to said pilot wall at one end and said centerbody at a second end.

THE PRIOR ART

The references relied upon by the examiner as evidence of obviousness are:

Richardson et al. (Richardson)	3,430,443	Mar. 4, 1969
Retallick et al. (Retallick)	5,346,389	Sep. 13, 1994
Pfefferle et al. (Pfefferle)	5,634,784	Jun. 3, 1997

THE REJECTIONS

Claims 1 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pfefferle in view of Retallick.

Claims 2, 3, 5 and 6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pfefferle in view of

Appeal No. 2000-01345
Application 09/097,176

Richardson.

Attention is directed to the appellants' brief (Paper No. 7) and to the examiner's answer (Paper No. 10) for the respective

positions of the appellants and the examiner with regard to the merits of these rejections.²

DISCUSSION

Pfefferle, the examiner's primary reference, discloses "ultra-low emission combustors using available catalysts and catalyst support materials, combustors which are capable of operating not only at the low combustion temperatures of conventional catalytic but also of operating at the high combustor outlet temperatures required for full power operation of modern gas turbines" (column 2, lines 40 through 45). As explained in the reference,

a radial flow catalyst element can be integrated into an aerodynamically stabilized burner to provide a catalytically reacted fuel-air mixture for enhanced flame stabilization with catalyst temperature maintained by recirculation of

² As a result of the amendments subsequent to final rejection (see n.1, supra), the examiner has withdrawn the 35 U.S.C. § 112, second paragraph, rejection of claims 1 through 3 and 6 which was set forth in the final rejection (see the advisory action dated November 24, 1999, Paper No. 9).

hot combustion gases at a temperature high enough even for combustion of methane at ambient combustor inlet air temperatures yet at a temperature well below the adiabatic combustion temperature thus allowing burner outlet temperatures high enough for modern gas turbines. . . . In operation of a burner of the present invention, a fuel-air mixture is passed into contact with a catalytic element for reaction thereon. The resulting reacted admixture is then admixed with the fresh fuel and air passing into the combustor thus enhancing reactivity and enabling stable combustion even with very lean fuel-air admixtures of 0.2 or even 0.1 equivalence ratio [column 2, lines 9 through 29].

Pfefferle states that such combustors are particularly suited for use as pilot burners (see column 3, lines 19 through 23). Figure 1 illustrates an exemplary embodiment wherein

fuel and air are passed into contact with a radial flow mesolith catalyst 11 mounted within swirler 12 such that reacted gases from catalyst 11 are directed into admixture with the fuel and air passing through swirler 12 whereby the combustion effluent from catalyst 11 enhances efficient gas phase combustion of very lean fuel-air mixtures in reaction zone 14. . . . Recirculating combustion gases (shown by the arrows) maintains [sic] an effective catalyst temperature at low combustor

inlet temperatures [column 3, lines 34 through 44].

It is not disputed that the method and apparatus disclosed by Pfefferle meet all of the limitations in independent claims 1 and 4 except for those requiring the centerbody to be "non-catalytic." As indicated above, Pfefferle's centerbody (element 11) is catalytic. The examiner relies on Retallick to overcome this deficiency.

Retallick discloses a multi-stage combustion apparatus for use in high temperature environments such as gas turbines. The apparatus includes a catalytic ignition stage and subsequent stages, which may be catalytic or non-catalytic, to complete the combustion process (see the Abstract; column 1, lines 64 through 68; column 3, lines 27 through 31; and column 6, lines 45 through 63).

In combining Pfefferle and Retallick to reject claims 1 and 4, the examiner concludes that

it would have been obvious to a person of ordinary skill in the art at the time the invention was made

to modify the centerbody of *Pfefferle et al.* to be constructed from the non-catalytic material of *Retallick et al.* because a centerbody constructed of either catalytic or non-catalytic material may be used from [sic, for] the same function of heating a fuel/air mixture [answer, pages 4 and 5].

It is not apparent, however, nor has the examiner cogently explained, why Retallick's disclosure that combustion stages downstream of an ignition stage can be catalytic or non-catalytic would have suggested making Pfefferle's element 11 non-catalytic. To begin with, a fair reading of the Pfefferle reference shows that the catalytic nature of element 11 is fundamentally important to Pfefferle's goals and objectives. Moreover, to the extent that Retallick is germane to Pfefferle, it is Retallick's ignition stage which would seem to be much more relevant to Pfefferle's combustion arrangement than Retallick's downstream combustion stages. Since this ignition stage is catalytic, it would not have afforded any suggestion to make Pfefferle's element 11 non-catalytic. In this light, the appellants' position that the combination of Pfefferle and Retallick proposed by the examiner stems from impermissible

hindsight is persuasive.

Therefore, we shall not sustain the standing 35 U.S.C. § 103(a) rejection of claims 1 and 4 as being unpatentable over Pfefferle in view of Retallick.

Claims 2 and 3 and claims 5 and 6 depend, respectively, from claims 1 and 4. In short, Richardson's disclosure of a liquid fuel combustion apparatus does not overcome Pfefferle's failure to respond to the "non-catalytic" limitations in parent claims 1 and 4.³

Accordingly, we shall not sustain the standing 35 U.S.C. § 103(a) rejection of claims 2, 3, 5 and 6 as being unpatentable over Pfefferle in view of Richardson.

³Inasmuch as the examiner relied on Retallick to meet the "non-catalytic" limitations in parent claims 1 and 4, it is unclear why Retallick was not applied in support of the rejection of dependent claims 2, 3, 5 and 6 which incorporate all of the limitations of their respective parent claims.

Appeal No. 2000-01345
Application 09/097,176

SUMMARY

The decision of the examiner to reject claims 1 through 6 is reversed.

REVERSED

PATENT

IAN A. CALVERT)
Administrative Patent Judge)
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) BOARD OF

LAWRENCE J. STAAB) APPEALS
Administrative Patent Judge) AND
) INTERFERENCES
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JOHN P. McQUADE)
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Appeal No. 2000-01345
Application 09/097,176

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